S. Thangaratinam, K. Brown, J. Zamora, et al. Pulse oximetry screening for critical congenital heart defects in asymptomatic newborn babies: a systematic review and meta-analysis. Lancet 379 (9835) (2012 Jun 30) 2459–2464

Objective: This study assessed the performance of pulse oximetry as a screening method for the detection of critical congenital heart defects (CHD) in asymptomatic newborn babies.

Background: Screening for critical congenital heart defects in newborn babies can aid in early recognition, which may lead to improved outcome. The potential predictive value of using pulse oximetry to screen for significant cyanotic CHD in newborns has been unclear. One difficulty of determining the potential value of universal screening of newborns with pulse oximetry from previous studies is that the relative infrequency of CHD made any individual study less able to demonstrate benefit. This meta-analysis with 229,421 newborn babies makes this a more powerful study.

Methods: In this meta-analysis, the authors searched Medline (1951–2011), Embase (1974–2011), Cochrane Library (2011), and SciSearch (1974–2011) for studies that assessed the accuracy of pulse oximetry for the detection of critical CHD in asymptomatic newborn babies. Two reviewers selected studies that met the predefined criteria for population, tests, and outcomes, and sensitivity, specificity, and corresponding 95% CIs for individual studies were determined.

Results: This meta-analysis identified 13 studies, published from 2001 to 2011, that screened 229,421 asymptomatic newborn infants for critical CHD (defined as disorders from which infants died or required invasive procedures or surgery in the first 28 days of life). The overall sensitivity of pulse oximetry for detection of critical CHD was 76.5%. The specificity was 99.9%, with a false-positive rate of 0.14%.

Measurement of pulse oximetry before 24 h of age improved sensitivity from 77.5% to 84.8% (a nonsignificant difference) but increased the false-positive rate from 0.05% to 0.5% (a significant difference; $p = .0017$). Location of the pulse oximeter probe did not affect sensitivity or the frequency of false-positive results. Thangaratinam and colleagues concluded that pulse oximetry is a highly specific test for detection of critical CHD in newborn infants, and that the false-positive rate is low, especially when done after 24 h of age.

Conclusion: Pulse oximetry is highly specific and moderately sensitive for detection of critical CHD and it meets the criteria for universal screening.

Clinical perspective

Pulse oximetry screening can lead to the early detection of lesions such as coarctation of the aorta, interrupted aortic arch, transposition of the aorta, aortic and pulmonary stenosis, tetralogy of Fallot, pulmonary atresia and total anomalous pulmonary venous connection. Early correction of these lesions before the onset of acidosis and decompensation can lead to an improved outcome.

The American Academy of Pediatrics endorsed universal newborn screening with pulse oximetry earlier this year and stated that screening should be performed after 24 h of age and should include readings from both the right hand and either foot. They recommend a "pass" oxygen saturation level of 95%, repeat screens at oxygen saturations of 90%–95%, and immediate evaluation in infants whose pulse oximetry readings are less than 90%.

Contributed by

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U. Hoffmann, Q.A. Truong, D.A. Schoenfeld, E.T. Chou, P.K. Woodard, J.T. Nagurney, J. Hector Pope, T.H. Hauser, C.S. White, et al for the ROMICAT-II Investigators. Clinical perspective on : coronary CT angiography versus standard evaluation in acute chest pain. N. Engl. J. Med. (367) 2012 299–308.

Summary of ROMICAT II study

The ROMICAT II study was a multi-centric study aimed to evaluate the effectiveness of coronary computed tomographic angiography (CCTA) in suspected patients of acute coronary syndrome (ACS) seen in the emergency room (ER). Eligibility criteria were patients with acute chest pain not showing ischemic changes in the ECG and having normal troponin levels. Out of a total 1000 acute chest patients enrolled, 501 were randomly assigned to the investigation group where CCTA, performed as early as possible, was the first diagnostic test. The remaining 499 patients were given standard emergency room care. The following end points were compared in the two groups, both at baseline and after 28 days: (i) duration of hospitalization (ii) time to diagnosis (iii) direct discharge rate from ER (iv) re-hospitalization after 28 days (v) adverse cardiac events after 28 days.

A total 8% patients with acute chest pain had acute coronary syndrome (mean age 54 ± 8, male 53%) .When compared to patients receiving standard evaluation, patients undergoing CCTA were observed to have shorter hospital stay (reduced by 7.6 h, $P < 0.001$), duration of hospitalization (23.2 ± 37.0 h vs. 30.8 ± 28.0 h, $P < 0.001$), and a higher incidence of discharge done directly from the emergency room (47% vs. 12%, $P < 0.001$). The incidence of adverse cardiac events and re-hospitalization, and the cost of care ($4289 (Rs. 239540) vs. $ 4060 (Rs. 226751)), were found to be comparable in the two groups.

Emergency use of CCTA in ACS patients, reduced the time to diagnosis by quicker exclusion of CAD, leading to faster discharge (done directly from ER) and lesser need for hospital admission at the initial presentation (30% vs. 60%, P, 0.001). The overall morbidity and readmission rates (at 1 month) and cost of care were however not reduced. Significantly, in patients in whom ACS was diagnosed, duration of hospitalization was similar in the two groups (86.3 ± 72.3 vs. 83.8 ± 61.3, $P = 0.87$).

Clinical perspective

The ROMICAT II study shows that in patients presenting with acute chest pain, use of coronary computed tomography

angiography reduces the overall length of stay in the hospital and also allowed for the direct discharge from the emergency room. At the same time, there was no decrease in the overall cost of care and increased radiation exposure.

Now putting these results in proper perspective, the patients of ROMICAT II had an average age of 54 years, 47% were women, all had normal ECG's and all had normal troponin levels. With all these parameters, the probability of occurrence of coronary artery disease itself is so low that whether one needs to do further testing at all in these patients can be questioned and most definitely cannot be recommended as a general policy for all. Most of us would probably not ask for any investigations beyond a few hours of observation, some serial ECGs and a troponin level at the end of it all!

If you want to consider this from country wise perspective then for a country like the USA where even one missed coronary event can lead to a lawsuit, protective medicine will probably result in this study leading to CTA becoming part of the emergency room protocols for chest pain. This type of protective medicine fortunately is not yet practiced in India.

If we look at the cost of care of chest pain (excess of Rs 2 lakhs!), then perhaps a CTA within a few hours of admission cutting down the cost of admission could be one new way of looking at this issue but then this was not the question addressed in this study.

At the same time one should not discount the utility of coronary CT angiography in select situations in the emergency room, where you want to be very confident about the coronary anatomy (e.g. VIP or faculty colleague or relative) or where a patient keeps coming back and will not be convinced without a normal report, then a CTA is the answer.

So, in conclusion, in most situations especially as a public policy, simple observation and clinical testing would be better than CTA, though a CTA should always be available for selected situations.

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H. Thiele, U. Zeymer, F.J. Neumann, et al. Intraaortic balloon support for myocardial infarction with cardiogenic shock. N. Engl. J. Med. (2012)10,1056/NEJMoa1208410

"By failing to prepare you are preparing to fail." — Benjamin Franklin

Intra-aortic balloon counter-pulsation (IABP) is one of the most commonly used haemodynamic support device in the setting of haemodynamic instability complicating myocardial infarction. IABP support gets class I recommendation for this condition even though the evidence for such recommendation is scarce. In the IABP SHOCK II trial 600 patients with acute myocardial infarction and cardiogenic shock undergoing early revascularization were randomised to IABP and no IABP. IABP use was not associated with any significant difference in the 30-day mortality or hospital stay. At 30 days, 39.7% of the IABP patients and 41.3% of controls had died ($p = 0.69$). Interestingly, there was no IABP related side effects in the IABP group. Most of the patients (86.6%) received IABP immediately after the procedure and 10% patients in no IABP arm crossed over to IABP arm. There was no difference in the primary end point of mortality among the various subgroups of age, gender, type of MI and blood pressure.

Major limitations in this study as discussed in the accompanying editorial were a relatively smaller sample size and a lower mortality rate as compared with other contemporary trials. This makes it a relatively moderate risk group where benefit of IABP may be lower than in high risk patients. A 10% crossover rate is another limiting factor, although on treatment analysis after accounting for the crossover, also failed to prove benefit for IABP use.

Perspective

Fifty years after first technical demonstration of the utility of IABP at the Cleveland clinic, several serious questions are being raised regarding the efficacy of IABP. Although IABP is a class I recommendation for refractory cardiogenic shock as per ACC/AHA and ESC guidelines, the evidence for the use of IABP is mainly from small randomised studies or retrospective analysis. The basic haemodynamic principle of IABP is improvement in diastolic coronary perfusion and systolic unloading of the heart. Intuitively this principle appears quiet promising in the setting of STEMI with cardiogenic shock but has failed on clinical grounds. A meta-analysis published in 2009 also failed to show any benefit for IABP in the setting of primary PCI with cardiogenic shock.

Two more trials published recently have failed to show any benefit for IABP in the setting of anterior wall STEMI and complex PCI. Counter-pulsation to Reduce Infarct Size Pre-PCI-Acute Myocardial Infarction (CRISP-AMI) trial randomised 337 patients with stable AWSTEMI who underwent primary PCI with/without IABP support. There was no difference in the 30-day and 6 months death or MI rates between the two groups. Assessment of infarct size by cardiac MRI 4 days after MI was also not different. Second trial, Balloon-Pump Assisted Coronary Intervention Study (BCIS)-1 randomised patients with low EF and undergoing PCI, to IABP and no IABP. It had shown no difference in the risk of major adverse cardiac and cerebrovascular events (MACCE) at the time of hospital discharge among patients treated with IABP when compared with those who did not receive counter-pulsation. However, long term results of this study after a median follow up of 51 months have shown a 34% reduction in the mortality.

The three trials mentioned earlier have studied the utility of IABP in complex PCI, STEMI and cardiogenic shock, with none of them supporting the use of IABP in these conditions. Registry data from Cath-PCI registry has shown no difference